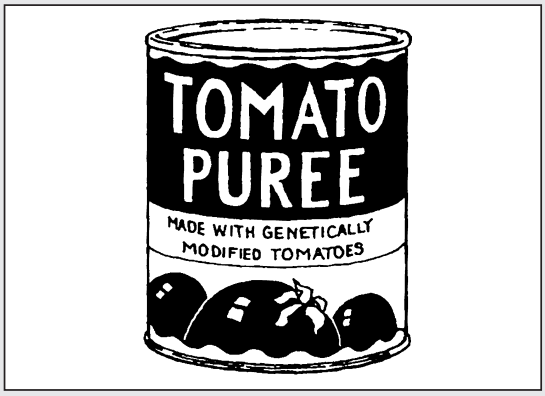
Modification or meddling?



Scientists have discovered the gene that turns tomatoes soft as they ripen. They have also found out how to switch this gene off. This means that the tomatoes can be left on the plant to develop their flavour and colour but stay firm. Fewer of the tomatoes are wasted. Tomato purée made from these tomatoes is cheaper.

In genetically modified (GM) food individual genes are inserted from one species into another. Genes have been put into crops such as corn and soya beans to make them resistant to weedkillers or able to make their own pesticides. Farmers are afraid that 'Frankenstein GM' crops might pass on their characteristics to weeds and create 'superweeds'. Scientists have denied this and claim that less herbicide will be used.

Genetically modified corn and soya find their way into many of our processed food products and animal food. Many scientists argue that GM foods are safe while others are concerned about their safety. In Aberdeen it was claimed that laboratory rats suffered damage to their immune systems after eating GM potatoes.

In the USA, the Monarch butterfly caterpillars have been killed by the pollen from corn that has been made pest-resistant by adding bacterial genes. The opposition claims that the butterflies would have been killed by the insecticides that were avoided.

Another advantage of GM food is that we will be able to grow more food to feed people in countries where it is hard to grow food, for example because there is little water. In fact, we could all benefit from better quality and cheaper food that lasts longer.

To clone, or not to clone?

That is one of the big ethical questions today.

Clones are organisms with identical genes. For example, Dolly the sheep is a man-made copy of another sheep. Dolly the cloned sheep was created by destroying the nucleus of a sheep's egg cell and replacing it with a nucleus from a cell of a sheep with desirable features. This is a difficult process – 276 attempts were needed to create Dolly! The new egg grew into Dolly inside a new mother.

Some of the advantages of cloning farm animals are obvious. Herds of identical cows producing high milk yields could reduce our shopping bills and the cloning of disease-resistant farm animals could help to solve world food shortages.

Rare and endangered species could be cloned and saved from the threat of extinction.

Less obvious are the medical applications. Scientists have inserted human genes into calves and sheep so that they can make medicines to treat human genetic diseases such as cystic fibrosis.

The technology is available to clone human embryos. Some scientists believe that this would be a good thing as it would help them eliminate genetic disorders that cause much suffering to people who inherit them.

Others are concerned that any human cloning experiments would be unethical because they consider each embryo to be a new human life, and so using these embryos would be destroying human life. Protesters fear it would lead to attempts to create 'super humans' and 'designer babies' with looks to order.